



El Camino College
COURSE OUTLINE OF RECORD – Official

Course Acronym:	ATEC
Course Number:	34
Descriptive Title:	Automatic Transmissions
Division:	Industry and Technology
Department:	Automotive Technology
Course Disciplines:	Automotive Technology
Catalog Description:	<p>This course covers the theory and operation, diagnosis, service, and repair of automotive automatic transmissions and transaxles.</p> <p><i>Note: The two-course sequence Automotive Technology 34 and 35 is the same as Automotive Technology 33. Students who have completed Automotive Technology 34 and 35 will not receive credit for Automotive Technology 33.</i></p>
Prerequisite:	
Co-requisite:	
Recommended Preparation:	Automotive Technology 1 and Automotive Technology 22A or Automotive Technology 23 and 24; Automotive Technology 22B or Automotive Technology 25 and Automotive Technology 26 and eligibility for English 1A
Enrollment Limitation:	
Hours Lecture (per week):	2.5
Hours Laboratory (per week):	4.5
Outside Study Hours:	5
Total Course Hours:	126
Course Units:	4
Grading Method:	Letter Grade only
Credit Status:	Credit, degree applicable
Transfer CSU:	Yes
Effective Date:	Prior to July 1992
Transfer UC:	Yes
Effective Date:	
General Education: ECC	
Term:	
Other:	
CSU GE:	
Term:	

Other:	
IGETC:	
Term:	
Other:	
Student Learning Outcomes:	<p>SLO #1 Safety</p> <p>Students must comply with shop safety practices though safety exam proficiency.</p> <p>SLO #2 General</p> <p>Students will examine general automatic transmission and transaxle diagnosis.</p> <p>SLO #3 In-Vehicle</p> <p>Students will illustrate in-vehicle automatic transmission/transaxle maintenance and repair.</p> <p>SLO #4 Off-Vehicle</p> <p>Students will illustrate off-vehicle automatic transmission/transaxle repair.</p>
Course Objectives:	<ol style="list-style-type: none"> 1. A student must be proficient in automotive lab safety policies set by the automotive department. Proficiency set by the department will meet current industry standards. 2. Select and use the proper tools and equipment safely and efficiently. 3. The student must be able to diagnose various faults in automatic transmission and transaxle. 4. The student understands the common maintenance and repair procedures used for in-vehicle automatic transmissions and transaxles. 5. The student understands out of vehicle repair procedures used on automatic transmissions and transaxles.
Major Topics:	<p>I. Shop Policies Safety, Automotive Service Industry Terms, Precision Measuring and Tools (2.5 hours, lecture)</p> <p>A. Safety information and test</p> <ol style="list-style-type: none"> 1. Course requirements 2. Safety and Pollution Prevention (SP2) 3. Shop policies <p>B. Automotive service industry terms</p> <ol style="list-style-type: none"> 1. Service information resources 2. Requirements for Automotive Service Excellence (ASE) certification 3. Legal rights and responsibilities under repair orders <p>C. Precision measuring, tools and instruments</p> <ol style="list-style-type: none"> 1. Precision measuring, tools and instruments 2. Math and measuring correcting clearances

II. Shop Policies Safety, Automotive Service Industry Terms, Precision Measuring and Tools (7 hours, lab)

- A. Precision measuring - Metric and U.S. customary systems for distance, volume and torque
- B. Tools and equipment
 - 1. Diagnostic tools for Transmissions
 - 2. Safety practices
 - 3. Hazardous materials
 - 4. Occupational Safety and Health Administration (OSHA)
- C. Repair Orders
 - 1. Vehicle inspections
 - 2. Service repair order
 - 3. Parts and labor calculations
 - 4. Using workshop, electronic or other service information

III. Automatic Transmission - General Theories of Operation, Diagnosis, Maintenance and Basic Adjustments (5.5 hours, lecture)

- A. Factors that determine shift
- B. Four basic systems
- C. Torque converter
- D. Hydraulic machines operation
- E. Transmission's hydraulic circuit
- F. Valve body, fluid flow and pressurization
- G. Reaction members

IV. Automatic Transmission - General Theories of Operation, Diagnosis, Maintenance and Basic Adjustments (10 hours, lab)

- A. Problem analysis
- B. Driver's complaint
- C. Road test the vehicle
- D. Researching service information
- E. Preliminary checks, visual inspection and diagnosis
- F. Determine the needed repairs and verify repair
- G. Fluid inspection, replace fluid and filters
- H. Noise and vibration problems
- I. Oil pressure tests
- J. In vehicle repairs manual valve shift linkage, extension housing and parking pawl

V. Electronic Controls/Electrical and Electronic System Diagnosis and Service (11.5 hours, lecture)

- A. Electrical terms
- B. Ohm's law
- C. Electronically controlled transmission systems
- D. Input and output devices
- E. Basic types of sensors
- F. Elementary shift logic chart

- G. Shift characteristics of each selector lever position
- H. Adaptive learning

VI. Electronic Controls/Electrical and Electronic System Diagnosis and Service (18.5 hours, lab)

- A. Road test
- B. Electrical or mechanical faults
- C. Preliminary checks and trouble codes
- D. Converter clutch system
- E. Switches, sensors and solenoids
- F. Transmission-related electrical/electronic components
- G. Diagnostic procedures for Diagnostic Trouble Code (DTC) and/or symptom

VII. Automatic Transmission Designs/Rebuilding Transmissions and Transaxles (11.5 hours, lecture)

- A. Transaxle, transmission and driveline
- B. Common transmission model number systems
- C. Major internal parts of an automatic transmission/transaxle
- D. Compound planetary gearsets
- E. Seals and gaskets
- F. Mounts

VIII. Automatic Transmission Designs/Rebuilding Transmissions and Transaxles (18.5 hours, lab)

- A. Diagnosing
- B. Removing and installing
- C. Disassembling and reassembling
- D. Cleaning
- E. Transmission case bores, passages and bushings
- F. Vents
- G. Mating surfaces of a transmission case
- H. Extension housing bushings and seals
- I. External seals and gaskets

IX. Torque Converters and Pumps/Torque Converter and Oil Pump Service (4 hours, lecture)

- A. Purpose
- B. Major components
- C. Fluid flows
- D. Torque converter efficiency enhancement
- E. Stator
- F. Torque converter fluid flow
- G. Stall and coupling phase
- H. Torque converters with a clutch
- I. Typical electronic controls for a converter clutch
- J. Pumps in transmissions

X. Torque Converters and Pumps/Torque Converter and Oil Pump Service (7.5 hours, lab)

- A. Stall test
- B. Converter clutch system tests
- C. Hydraulically or electrically controlled
- D. Flexplate, attaching bolts and pilot
- E. Pump drive surfaces
- F. Measuring torque converter end play
- G. Checking stator clutch
- H. Cooling system
- I. Cooler, lines and fittings
- J. Oil pump assembly and related components

XI. Hydraulic Circuits and Controls/General Hydraulic System Service (5 hours, lecture)

- A. Hydraulic controls used in modern transmissions
- B. Pressures
- C. Basic types of valves used in automatic transmissions
- D. Pressure Control solenoid (PC solenoid) assembly
- E. Load-sensing devices for automatic transmission efficiency
- F. Transmission valve body

XII. Hydraulic Circuits and Controls/General Hydraulic System Service (7.5 hours, lab)

- A. Valve body remove and install
- B. Valve body bores
- C. Mating surfaces
- D. Spacers and gaskets
- E. Bolt torque

XIII. Gears and Shafts/Gear and Shaft Service (2.5 hours, lecture)

- A. Basic planetary gearset
- B. Gear ratios
- C. Simpson-gear-based transmissions
- D. Ravigneaux-gear-based transmissions
- E. Lepelletier-gear-based transmissions
- F. Planetary gearsets in tandem

XIV. Gears and Shafts/Gear and Shaft Service (6 hours, lab)

- A. Thrust washers, bearings and bushings
- B. Shafts and shaft seals
- C. Drive chains, sprockets and gears
- D. Parking pawls
- E. Final drive components

XV. Reaction and Friction Units/Friction and Reaction Unit Service (2.5 hours, lecture)

- A. Reaction members
- B. Hydraulic servo and brake band

	<p>C. One-way clutches D. Multiple-disc clutch</p> <p>XVI. Reaction and Friction Units/Friction and Reaction Unit Service (6 hours, lab)</p> <p>A. Bands B. Friction and pressure plates C. Servo and accumulator D. Roller and sprag clutch E. Clutch pack clearance and air test operation</p>
Total Lecture Hours:	45
Total Laboratory Hours:	81
Total Hours:	126
Primary Method of Evaluation:	3) Skills demonstration
Typical Assignment Using Primary Method of Evaluation:	Analyze a vehicle's transmission/transaxle problem and research shop manual diagnostic references needed to write a one-page repair order indicating correct repair procedures and perform needed repairs according to manufacturer's specifications. Submit repair order to the instructor.
Critical Thinking Assignment 1:	Prepare a two-page report on the latest driveline technologies being used in the automotive industry. Submit report to the instructor.
Critical Thinking Assignment 2:	Complete a seven- to ten-page worksheet packet that covers specific Automotive Service Education Foundation tasks for ASE A2 automatic transmissions. Submit the completed worksheet packet to the instructor.
Other Evaluation Methods:	<p>Performance Exams Objective Exams Quizzes Laboratory Reports Class Performance Homework Problems Term or Other Papers Multiple Choice Completion Matching Items True/False Journal (kept regularly throughout the course)</p>
Instructional Methods:	<p>Demonstration Discussion Field trips Group Activities Guest Speakers Laboratory Lecture Multimedia Presentations Simulation</p>
If other:	<p>Internet Presentation/Resources Automotive Component Models Collaborative Learning E Based Learning</p>

Work Outside of Class:	Study Answer questions Required reading Problem solving activities Written work Observation of or participation in an activity related to course content
If Other:	Web-based training
Up-To-Date Representative Textbooks:	Jack Erjavec, <u>Today's Technician: Automatic Transmissions and Transaxles Classroom and Shop Manual (Bundle)</u> , 7th edition, Cengage Learning, 2020
Alternative Textbooks:	
Required Supplementary Readings:	
Other Required Materials:	Shop safe clothing Three-ring binder Notebook and paper Pen and pencil Safety glasses Shop safe clothing Closed-toe shoes Tools (optional)
Requisite:	
Category:	
Requisite course(s): List both prerequisites and corequisites in this box.	
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	
Requisite Skill:	
Requisite Skill and Matching Skill(s): Bold	

the requisite skill(s). If applicable	
Requisite course:	Automotive Technology 1 and Automotive Technology 22A or Automotive Technology 23 and Automotive Technology 24 and Automotive Technology 22B or Automotive Technology 25 and Automotive Technology 26
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	Ability to perform electrical diagnosis. ATEC 24 - Perform engine diagnosis using a flow chart. ATEC 23 - Determine engine condition by performing compression, cylinder leakage, and vacuum tests. ATEC 24 - Test and diagnosis of an engine using engine testing equipment. ATEC 26 - Perform engine diagnosis using a flow chart. ATEC 26 - Test and diagnose an engine using OBD 2 scan tools/engine analyzers. ATEC 25 - Diagnose and repair electrical circuits. ATEC 25 - Examine electrical components. ATEC 23 - Evaluate and test engine condition and performance using engine analyzer/scanner. ATEC 25 - Diagnose electrical circuits (Automotive Service Excellence (ASE) tests). ATEC 26 - Test, diagnose and repair computer controlled systems. ATEC 24 - Evaluate and repair fuel injection systems. ATEC 22A - Test, evaluate, and repair electrical circuits. ATEC 25 - Diagnose and repair computer controlled systems. ATEC 26 - Analyze electrical testing data and recommend repairs. ATEC 25 - Evaluate computer controlled components. ATEC 24 - Analyze computer controlled engine data and form a conclusion of recommended needed repairs.

	<p>ATEC 23 - Interpret engine analyzer/scanner data and recommended repairs needed.</p> <p>Select and use the proper tools.</p> <p>ATEC 1 - Select and use the proper tools.</p> <p>Inspect and maintain drive line components and fluid levels.</p> <p>ATEC 1 - Inspect and maintain drive line components and fluid levels.</p> <p>Perform diagnostic tasks using a flow chart.</p> <p>ATEC 22B - Perform engine diagnosis using a flow chart.</p> <p>Test, evaluate, and repair electrical circuits.</p> <p>ATEC 22A - Test, evaluate, and repair electrical circuits.</p> <p>Evaluate, diagnose and repair electrical systems</p> <p>ATEC 22B - Evaluate, diagnose and repair electrical systems.</p>
Requisite Skill:	Eligibility for English 1A
Requisite Skill and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s). If applicable	<p>Ability to read automotive related material.</p> <p>Summarize, analyze, evaluate, and synthesize college-level texts.</p> <p>Ability to write an automotive report.</p> <p>Write a well-reasoned, well-supported expository essay that demonstrates application of the academic writing process.</p>
Enrollment Limitations and Category:	
Enrollment Limitations Impact:	
Course Created by:	John Lewis
Date:	10/25/1985
Original Board Approval Date:	
Last Reviewed and/or Revised by:	Edward Matykiewicz
Date:	05/03/2022
Last Board Approval Date:	1/17/2023